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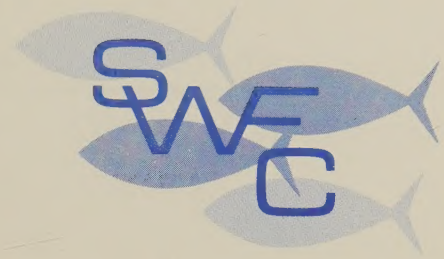

SOUTHWEST FISHERIES CENTER

REPORT OF ACTIVITIES JANUARY-FEBRUARY 1986

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1983. A revision of the fishes of the Family Pentacerotidae (Perciformes). N.Z. J. Zool 10:177-220) Hardy placed the pelagic armorhead back into the genus Pseudopentaceros and recognized three species. Two new species, P. wheeleri and P. pectoralis, occur in the North Pacific and are sympatric at the southern Emperor-northern Hawaiian Ridge seamounts. Pseudopentaceros wheeleri is distinguished from P. pectoralis primarily by a standard length/body depth at first anal spine (SL/BDFAS) ratio of 3.1-4.0 for P. wheeleri as opposed to 2.4-2.9 for P. pectoralis. A secondary criterion used is a ratio of head length/least bony interorbital width (HL/LBIW). For this criterior, P. wheeleri has a ratio of 3.0-3.4 compared to 2.2-2.9 for P. pectoralis.

Suspecting that these results reflected an inadequate sample of southern Emperor-northern Hawaiian Ridge morphotypes available in that study, Humphreys collected samples of the different morphotypes from the Hancock Seamounts. Based on SL/BDFAS ratio, all 108 lean fish and 101 of 105 intermediate fish examined were determined to be P. wheeleri, and fat fish were found to be P. wheeleri (13) and P. pectoralis (66). Humphreys also examined 14 open ocean fat type (all P. pectoralis) and several large specimens from the Northwestern Hawaiian Islands which were found to be both species. However, a plot of the two body proportions (Figure 1) shows

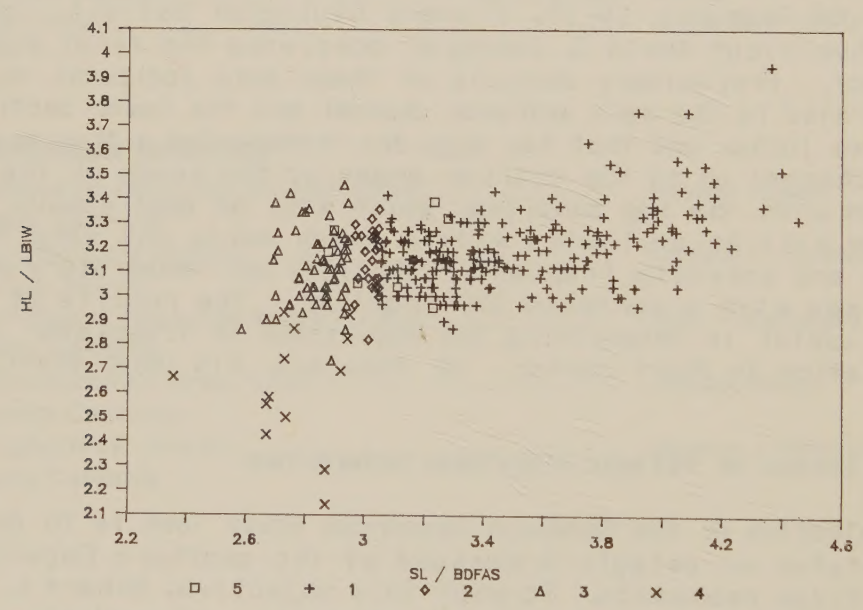

Figure 1. Plot of HL/LBIW vs SL/BDFAS for pelagic armorhead examined in this study. Numbers represent the following: 1 = P. wheeleri, 2 = intermediate specimens between P. wheeleri and P. pectoralis in SL/BDFAS, 3 = P. pectoralis (1-3 from the Hancock Seamounts), 4 = open ocean P. pectoralis, and 5 = large NWHI specimens.

intermediate SL/BDFAS values of 2.95-3.05 (represented by 1 large NWHI specimen, 4 intermediate types, and 24 fat types) contrary to Hardy's study. The secondary criterion HL/LBIW failed to distinguish between the

two species, although it separated most P. pectoralis from the Hancock Seamounts from open ocean P. pectoralis. Contingency table analysis of 11 meristic characters revealed no significant differences between species or sexes. Preliminary results of an electrophoretic examination of Hancock Seamount morphotypes by Gary A. Winans of the Northwest and Alaska Fisheries Center, Seattle Laboratory, indicate no significant allelic or genotypic differences, although a larger sample of the fat morphotype (n = 24) would increase confidence in these findings.

Morphometric, meristic, and electrophoretic results thus far refute any basis for Hardy's recognition of two North Pacific pelagic armorhead species. The continuum of SL/BDFAS variation and its possible relation to body fat content and reproductive maturity suggest that the morphotypes represent different phases in the life history of a single species. Current research is focusing on life history aspects to test this hypothesis. (R. Humphreys, Jr., FTS (808) 943-1221)

FISHERY MANAGEMENT RESEARCH PROGRAM

Draft 1985 Lobster Fishery Report Completed

Dr. Robert A. Skillman, Leader, Fishery Management Research Program, has completed a draft of the "Annual Report of the 1985 Western Pacific Lobster Fishery" with the assistance of Joan P. Thomason, Computer Programmer, and Research Assistant Raymond P. Clarke. Enforcement and administrative details from the Southwest Region, however, have not yet been incorporated into the report. The following summary is taken from the draft report.

Most of the fishing regulated by the lobster fishery management plan occurred in the Northwestern Hawaiian Islands. There were only a few exploratory cruises to the main Hawaiian Islands and there was no fishing in American Samoa or Guam.

Record high estimated sales (expanded from reported values) for spiny and slipper lobsters were recorded in the fishery in 1985: 500 metric tons (MT) (1,095,000 lb) of spiny lobster valued at $3,478,000 and 320 MT (704,000 lb) of slipper lobster valued at $1,306,000.

Likewise, catch reported on logbooks for spiny and slipper lobsters was the highest recorded since the fishery came under management in March 1983. The reported catch of 956,042 spiny lobsters was 6.1 times that in 1983, and the reported slipper lobster catch of 1,189,842 was 46.5 times that in 1983.

The fishery expanded to include 13 different fishing grounds in the Northwestern Hawaiian Islands.

For spiny lobster, the three most important fishing grounds (in descending order) were Maro Reef, St. Rogatien Bank (first year in the fishery), and Gardner Pinnacles; for slipper lobster, the order was Maro

Reef, Gardner Pinnacles, and St. Rogatien Bank. Necker Island, exploited since the start of the fishery, dropped from the top three.

For the first time, the spiny lobster catch did not account for a majority of the reported catch; the slipper lobster catch accounted for 45.4% and spiny lobster 36.5% of the total lobster catch. The remainder of the catch was composed of berried and sublegal lobsters.

The greatest number of vessels (16), trips (62), days fished (1,653), and trap-nights fished (1,089,462) were recorded this year.

In terms of the number of trap-nights fished, the top three fishing grounds were Maro Reef, Necker Island, and St. Rogatien Bank. For number of days fished, Gardner Pinnacles replaced St. Rogatien Bank for third place.

The catch rate for legal spiny lobster declined from 2.05 lobsters per trap-night in 1983 to 1.17 in 1984 and 0.88 in 1985, and catch rate for sublegal spiny lobster declined from 0.66 lobsters per trap-night in 1983 to 0.63 in 1984 to 0.32 in 1985. The trends were similar on the three traditional fishing grounds, namely Necker, Maro, and Gardner. Catch rate for total slipper lobsters increased from 0.33 lobsters per trap-night in 1983 to 0.75 in 1984 and 1.09 in 1985.

For the first time, the overall catch rate of slipper lobsters (1.09 lobster per trap-night) exceeded that of spiny lobsters (0.88). The catch rate of slipper lobsters exceeded that of spiny lobsters on Brooks Banks, Gardner Pinnacles, Lisianski Island, Maro Reef, and Northampton Banks; on Gardner and Maro, this represents a reversal from previous years.

At Necker Island, the proportion of sublegal spiny lobsters in the catch exceeded that of legal lobsters for the first time.

Escape vent research has shown that vented traps catch more legal spiny lobsters and fewer sublegals than nonvented traps, especially when the two vents are located on the upper edge of the side panels. (R. Skillman, FTS (808) 943-1221)

Closed Season for Spiny Lobster Investigated

Dr. Skillman and Gary L. Kamer, Statistician, have been analyzing research and commercial catch data in response to a suggestion by lobster fishermen that a closed season may protect reproduction of spiny lobsters. Available data indicate that reproduction in spiny lobster occurs throughout the year in the main Hawaiian Islands and at least as far north as Necker Island and Maro Reef. Seasonality in reproduction becomes more apparent with increasing latitude. At Necker Island and Maro Reef, reproductive activity is greatest during the summer months and evident only during the summer at Midway Islands and Kure Atoll. Based on this analysis and other information, the Crustacean Plan Development Team of the Western Pacific Regional Fishery Management Council concluded that a closed season would provide limited conservation of reproductively active spiny lobster while it would have discriminatory economic impact on segments of the industry. Members of the team thought that other conservation tools, such

as use of escape vents, would be more effective. (R. Skillman, FTS (808) 943-1221)

First Volume of Report Series for Fishery Statistics Completed

David C. Hamm, Computer Systems Analyst, has designed a report series for easily distributing and sharing summary fishery information among fishery agencies in the western Pacific. This report series was designed in response to a need for such summaries expressed by agencies participating in the Western Pacific Fishery Information Network. The first volume in the series, "Fishery Statistics of the Western Pacific," has been completed and submitted for printing. This volume contains monthly and annual summaries by species for American Samoa (1982-84), the Commonwealth of the Northern Mariana Islands (1979-84), and Hawaii (1979-84), plus a variety of graphs for some of the most important fish species and groups from each area. The second volume, which will be completed by the summer of 1986, will contain summaries for Guam (1979-84) and possibly the Republic of Belau (1983-84). Volume three will contain 1985 data from each of these island groups and is tentatively scheduled for release by September 1986. (D. Hamm, FTS (808) 943-1221)

PELAGIC RESOURCES INVESTIGATION

Cardiovascular Dynamics of Tuna Studied

Dr. Richard W. Brill, Leader, Tuna Behavior and Physiology Task, and Research Assistant Peter G. Bushnell have been working for the past month with visiting scientists Dr. David Jones and Manabu Shimazu, Department of Zoology, University of British Columbia, on the cardiovascular dynamics of yellowfin tuna, Thunnus albacares. They have been working on the development of a new technique for measuring the metabolic rate and ventilation volume of free swimming tuna, and determination of blood acid-base changes in yellowfin tuna that are subjected to acute temperature changes. The experimental paradigms used in this latter study were based on data from the tuna tracking study which showed that small yellowfin tuna regularly expose themselves to very rapid 5°C temperature changes (25°-20°C) during their daily vertical movements. These three projects are part of a larger project to determine low, ambient oxygen tolerances of tunas, which will involve measuring ventilation volume of free-swimming tuna exposed to low oxygen, and the effect of temperature on low, ambient oxygen tolerances. Ambient oxygen level is an important factor with respect to tuna movements, gear vulnerability, and perhaps, rates of natural mortality. (R. Brill, FTS (808) 943-1221)

Preliminary Analysis of Tuna Tissue Completed

Research Assistant Robert E. Bourke has completed preliminary RNA-DNA analysis of tissue samples taken from small yellowfin tuna that were infested with the dorsal aorta parasite. This biochemical analysis

technique allows determination of instantaneous growth rates of fishes. The objective of this work is to determine if the parasite has any significant effects on growth rates and natural mortality rates of the yellowfin tuna. Preliminary analysis of the data indicates that the parasite does not affect growth rates. This is a somewhat surprising conclusion because of the extent of infestation seen in yellowfin tuna and the importance of the blood vessel (dorsal aorta) that the worms often appear to almost completely occlude. Bourke is still analyzing the data, however.

Since discovery of the dorsal aorta parasite in Hawaiian yellowfin tuna several years ago, staff of the Tuna Behavior and Physiology Task have been trying to identify the parasite. The parasite appears to be the larval form of a pleurocercoid cestode (tapeworm), but the lack of adult characteristics has prevented any further taxonomic classification. (R. Brill, FTS (808) 943-1221)

DATA MANAGEMENT AND TECHNICAL SERVICES

New Statistical Analysis Software Installed

Fletcher V. Riggs, Chief, Data Management and Technical Services, reports that the Statistical Analysis System (SAS) for Personal Computers (PC) software package has arrived at the Honolulu Laboratory and is now being installed in the IBM PC/AT computers. Staff at the Honolulu Laboratory have used the SAS extensively for data analysis through the use of an IBM 3081 mainframe at the University of Hawaii. Although the basic SAS package for the IBM PC/AT currently contains only a subset (data handling and rudimentary statistical analysis) of the mainframe package, an expansion of the PC version due to arrive this spring will greatly increase statistical analysis capabilities. The next increment of statistical packages added to the SAS-PC system will greatly reduce the dependence upon a costly external computer facility. Until all SAS statistical procedures required by the Honolulu Laboratory staff are available on the IBM PC/AT, users' programs and data files will be transferred between the PC/AT's at the Honolulu Laboratory and the University of Hawaii system via telecommunications. (J. Pappas, FTS (808) 943-1221)

COASTAL FISHERIES RESOURCES DIVISION
La Jolla, California

Dr. Reuben Lasker Addresses Australian and New Zealand Scientists

In February, Dr. Lasker attended the Australian Marine Sciences Association meeting in Hobart, Tasmania, where he gave an invited address to the opening plenary session on "Oceanography and the fluctuations of fish populations." At the Commonwealth Scientific and Industrial Research Organization Marine Laboratory in Australia he presented a seminar on "Recent studies on coastal pelagic fishes at the Southwest Fisheries Center" and contributed to an organizational meeting of Westpac, the South Seas component of the IOC initiative, Ocean Sciences in Relation to Living Resources.

At the New Zealand Oceanographic Institute in Wellington, New Zealand, Lasker was the invited guest speaker on "Recent advances in larval fish ecology" and participated in a workshop on techniques related to larval fish ecology, chaired by Aukland University professor Dr. Howard Choat.

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

Dover Sole Survey Systems Calculations Transferred to San Diego Supercomputer

Fishery biologist Dr. Paul E. Smith, biological aid Celeste Santos, oceanographer Larry Eber, and NMFS and UCSD senior computer science volunteer Tom Metzger, have converted one element of work on Dover sole (Microstomus pacificus) to the 2-month-old CRAY Supercomputer on the Campus of the University of California, San Diego. In addition to evaluating the supercomputer performance in the context of their work, they are establishing a mechanism for allocating sampling effort for the biomass estimate of the Dover sole.

For past work, sampling effort has been allocated according to the distance from the mainland coast. The Dover sole is distributed over a wide range of depths down to at least 900 meters. Thus the width of the continental slope is likely to determine the production and local recruitment of this species. For new work the information on regional and seasonal distribution can be used as a sample allocating tool for adult, juvenile, larva, and egg abundance estimates. (P. Smith, FTS 893-6346)

Species Assemblage Logic Program Completed

James D. Ryan, graduate student in Applied Ocean Sciences at Scripps Institution of Oceanography, is working with Drs. H. Geoffrey Moser and Paul E. Smith, Fishery Biologists, in completing a PASCAL version of the Fager Regroup Program. They have applied it to 907,000 specimens and

11,500 plankton tows taken monthly between 1954 and 1960. The logic of the program was orginally developed at the Oxford University Bureau of Animal Populations in 1955. The first FORTRAN program was completed at the Scripps Institution of Oceanography in 1960. The PASCAL program uses a linked list rather than a matrix approach. The latter approach would not have worked on the univeristy VAX because of the size of the matrices.

Currently the PASCAL program "affinity" operates on the UCSD VAX to extract co-occurrence data from the MOSER/CHARTER data base. The file of associations thus created is transferred to the IBM PC/AT where the REGROUP program assembles groups of species which are frequently found together. The program will be applied later this year to the entire time series from 1939 to 1984. Information from 1954 to 1960 will be presented by Drs. Smith and Moser at the 10th Annual Larval Fish Conference in Miami in May 1986.

Surveys to Estimate Biomass of Pacific Sardine Planned

In a cooperative project between the California Department of Fish and Game, the Scripps Institution of Oceanography, and the NOAA/NMFS Southwest Fisheries Center Coastal Division, new data have been gathered to support the observations that the Pacific sardine, Sardinops sagax, northern stock has undergone a recovery from extremely low biomasses of the past two decades (possibly less than 5,000 tons) to a spawning biomass in 1985 in excess of 20,000 short tons (18,200 metric tons). In the past 5 years, the incidence of Pacific sardine adults and larvae has increased in the fisheries and plankton surveys. In 1985, under the auspices of the California Cooperative Oceanic Fisheries Committee (CalCOFI), a specially designed ichthyoplankton survey was added to the routine CalCOFI survey to estimate the sardine spawning area directly. Given historical estimates of sardine female size and fecundity and assumed values for sardine spawning frequency, the spawning area was determined to be characteristic of a sardine biomass in excess of 20,000 tons.

In 1974, California legislators voted to prohibit sardine fishing. A feature of this law also provided for a 1,000 ton annual fishery when the California Department of Fish and Game determined that the population of adult sardines had reached 20,000 tons. Since the biomass has now reached the figure of 20,000 tons, the State authorized the 1,000 ton commercial fishery on sardines, beginning in January, 1986. Critical biological studies based on fishery data will also continue as the sardine stock recovers.

Another pair of surveys is planned for this year to obtain current estimates of female weight, fecundity and spawning frequency and to obtain an empirical frequency distribution of eggs per observation as a function of age. Since no absolute estimate of Pacific sardine spawning biomass is possible from the 1985 surveys, the 1986 survey data should provide information on the cost and sampling effort required for biomass estimates based on quantitative surveys.

Dr. Marc Mangel, Chairman of the Department of Mathematics at the University of California, Davis, Patricia Wolf, head of the Pelagic Fish programs at the California Department of Fish and Game, Long Beach, and Dr. Paul Smith of the SWFC met February 5 to discuss the results of the 1985 sardine surveys. They also discussed papers in preparation and plans for the 1986 survey. A review of the sardine time series is planned for the 1986 CalCOFI conference from October 20 to 23, 1986.

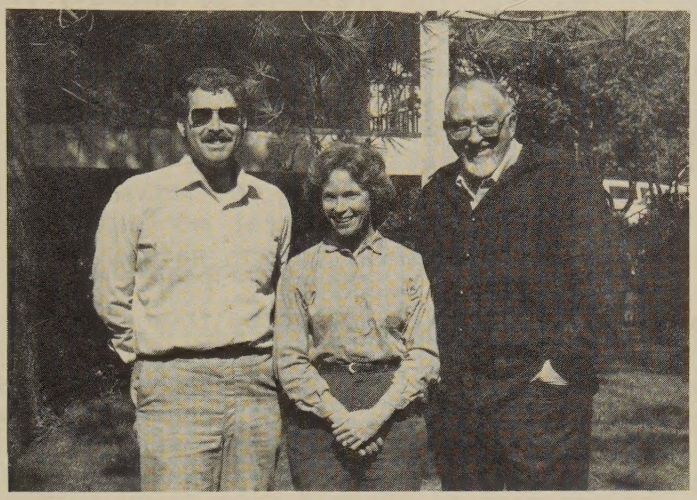

Figure 1. (from right to left) Dr. Marc Mangel, Patricia Wolf, and Dr. Paul E. Smith of the Pacific Sardine Recovery Team.

COASTAL EASTERN PACIFIC POPULATION BIOLOGY OF FISHES

Euphausia pacifica as an Important Predator on Yolk-Sac Larvae of Northern Anchovy Studied

As part of a study to determine the causes of mortality in anchovy larvae, Gail Theilacker, Fishery Biologist, and Amy Kimball, NOAA Junior Fellow, adapted an immunoassay to detect larval northern anchovy, Engraulis mordax, remains in the stomachs of laboratory-fed euphausiids, Euphausia pacifica.

Euphausiids, copepods, amphipods, and other small crustacea potentially prey on the earliest stages of marine fish larvae. Euphausiids, for example, co-occur in the sea with northern anchovy larvae, and in the laboratory individual euphausiids consume up to 25 larvae a day. If this predation rate occurs in the sea, euphausiids could be responsible for significant mortality in yolk-sac anchovy larvae as well as other fish larvae.

For the immunoassay (Enzyme-Linked Immunospot; ELISPOT), euphausiid stomach samples were spotted onto 0.45 m nitrocellulose and reacted with

an antibody, which was developed in rabbits, to anchovy egg yolk protein. The antibody did not cross-react with algae or invertebrates, potential euphausiid foods. A manuscript describing this technique "Use of an elispot immunoassay to detect euphausiid predation on larval anchovy" by Theilacker, Kimball and J.S. Trimmer has been accepted for publication in Marine Ecology-Progress Series.

Currently, Theilacker and Marlene Johnson, NOAA Junior Fellow, are using the assay to test for the presence of anchovy yolk protein in the stomachs of field-collected E. pacifica. Theilacker collected these samples aboard the NOAA Ship David Starr Jordan off the coast of southern California where anchovy were spawning. The field collections for this predation study were taken as part of an integrated, comprehensive study of the anchovy habitat, where intensive sampling at an inshore and an offshore site also will yield information on egg and larval production rates, total larval mortality, starvation-induced larval mortality, availability of prey for first-feeding anchovy and larval growth rates.

Mean size of 114 E. pacifica collected from the inshore study site was 12.25 mm, range 7.7 to 15.6 mm. Results of the Elispot assay showed that 91 of the euphausiids, 79%, gave positive reactions. Given that E. pacifica is the most abundant euphausiid species in the eastern boundary currents of the northeast Pacific, that about 500 individuals are under one square meter of sea surface (Brinton 1962), and that 12 mm E. pacifica eat up to 25 anchovy larvae per day in the laboratory, this high incidence of predation of euphausiids can translate into a sizeable larval anchovy mortality.

The Elispot assay is a quantitative technique, but application of the assay in the field cannot be quantified here because the absolute amount of yolk in an individual anchovy decreases with age and because the reactivity of the yolk protein to the antisera decreases in vivo. However, Theilacker can estimate the impact of euphausiid predation on larval anchovy by determining the incidence of positive euphausiid antigen-antibody reactions and adjusting for their temperature-specific digestion time, their size-specific feeding rates, their size-specific abundance, and relating the estimated extent of predation to the abundance of larval anchovy. Preliminary studies indicate that the presence of the yolk protein in euphausiid guts is labile; more tests are needed, but digestion appears to be complete in about 4 hours.

Unfortunately, there is a problem of unknown cross-reactions with yolk from other fish larvae. The antibody did not cross-react with egg yolk of white seabass, Atractoscion nobilis, but it did cross-react with sardine, Sardinops sagax. Theilacker plans to test yolk proteins of other teleosts as live eggs become available. However, in the predation study area, northern anchovy larvae are the most abundant larval fish, comprising about 80% of the total larval fish taken in recent surveys, and for this predation study, the relative larval abundances will be determined. Johnson plans to assay the control animals collected from an offshore site where anchovy were not spawning. (G. Theilacker, FTS 893-6331)

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

Fishery Population Dynamics Course Taught by Coastal Division Biologists

Drs. Richard Methot and Alec MacCall, Fishery Biologists, are teaching a course in Fishery Population Dynamics to staff of the California Department of Fish and Game. Twelve sessions of the course are scheduled between January and May. Seven sessions will cover numerical methods, mortality, catch and effort, mark-recapture, cohort analysis, growth, yield per recruit, and production models have been completed. In the remaining five sessions other topics on estimation of abundance and productivity will be covered.

Dover Sole Research Plan Prepared

Drs. John Hunter and Richard Methot have prepared a 3-year plan for SWFC research on Dover sole in the Morro Bay area. Dover sole is the largest volume fishery on the U.S. west coast, and landings from the southern portion of the fishing grounds near Morro Bay have increased several-fold since 1982. The target of the plan is to provide a fishery-independent estimate of Dover sole biomass in this region. Two estimation techniques will be explored: direct trawling, a technique commonly used for flatfish species, and the egg production method, successfully developed by the SWFC for multiple spawning pelagic fish. During a 5-day cruise in March 1986, biologists will collect specimens for estimating reproductive parameters and for establishing a brood stock in the SWFC aquarium. This cruise marks the beginning of the new CFRD program on west coast groundfish.

OCEANIC FISHERIES RESOURCES DIVISION
La Jolla, California

TUNA/BILLFISH INVESTIGATIONS

1985 Billfish Tag and Release Highlighted

Billfish anglers tagged and released 682 billfish (all species) in the Pacific Ocean during 1985. Tagging was down by 166 billfish in 1985, compared with the total tagged in 1984. The major area of tagging was about the southern tip of Baja California, Mexico where anglers tagged and released 363 billfish, 262 striped marlin (Tetrapturus audax), 75 Pacific sailfish (Istiophorus platypterus) and 26 blue marlin (Makaira nigricans). These billfish anglers participated in the Cooperative Marine Game Fish Tagging Program which is coordinated by fishery biologist James Squire.

Although environmental conditions were less than optimum and catch rates were down off southern California, billfish anglers tagged and released a near record 216 striped marlin and one short-billed spearfish (Tetrapturus angustirostris). The record number of marlin tagged and released off southern California was 225 marlin, tagged during the El Nino of 1983. The increased effort in tagging and releasing marlin off southern California since 1983 is a direct result of the support being given the program by the National Coalition for Marine Conservation - Pacific Region.

Squire of the SWFC's Cooperative Marine Game Fish Tagging is now distributing a newly designed billfish tag to cooperating anglers, developed by Michael Hall of South Australia. Hall's tag superficially resembles the old tag and can be used with the many hundreds of tag applicators used by anglers in the cooperative program. It is constructed of a vinyl material, printed with tag number and return information, fused onto a stainless steel wire. The tag is easy to apply, produces a smaller wound in the billfish and should result in a greater tag return rate owing to fewer lost tags (Figure 1). (J. Squire, FTS 893-6376)

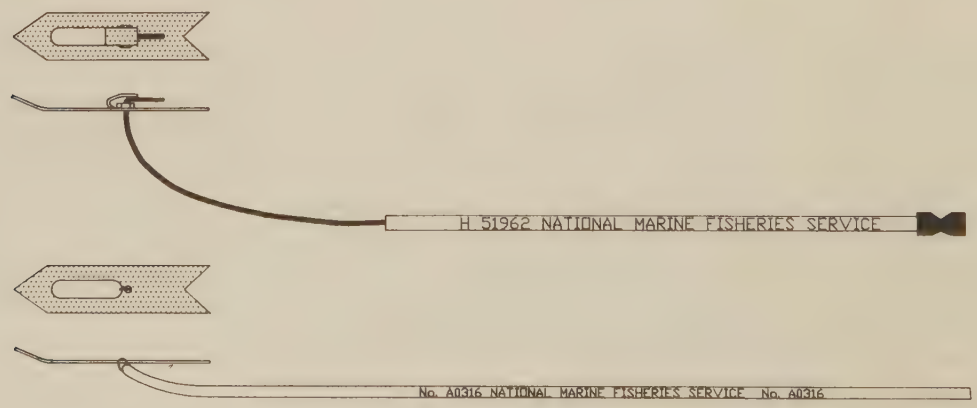

Figure 1. New billfish tag (bottom) compared with old tag.

BIOLOGICAL SYSTEMS INVESTIGATIONS

Large Number of Dolphins from a Single School Collected

The National Marine Fisheries Service places observers aboard tuna purse-seine vessels to collect field data and sample dolphins that are accidentally killed in the net during a set. The samples, which are sent to the Southwest Fisheries Center and other research centers, provide researchers with valuable information about the life history of dolphins. Recently, 61 spotted dolphins which had been taken during one set and an additional four taken earlier during the day were brought to the SWFC for dissection. Large-kill sets do not commonly occur these days and rarely are observers able to collect a large number of specimens from the same school. A large sample from one school provides researchers with a sample which is less biased than a sample from a small-kill set, which is usually composed of more mature females and young animals. The data from a large sample of specimens collected from the same school allows biologists an opportunity for research on life history without having to be concerned about the possible effects of geographic area, time, or school size and composition.

In a large-scale effort, organized by fishery biologist Aleta Hohn, researchers transported specimens to the SWFC for processing. The researchers collected a variety of data including information on morphometrics, specimen weight, teeth, and gonads for life history studies; stomachs for food habit studies (stomachs from a sample of tuna taken during the same set were also sampled); livers for stock differentiation using mitochondrial DNA; blubber samples, hearts, kidneys, and adrenal glands for measure of condition; and heads for examination of parasites and taxonomic studies. Anal glands of large males were collected for a researcher at the Naval Ocean Systems Center. Organ weights were recorded from a sample of the specimens. Mature females were examined to determine whether they were lactating or pregnant.

Hanna Bernard, Ruth Miller, and Susan Chivers of the Life History Monitoring Project and Jim Gilpatrick and Carrie Wilson of the Senior Scientist Unit, as well as many others from the Center worked diligently to process the animals quickly and efficiently. (A. Hohn, FTS 893-6820)

MULTISPECIES DATA MANAGEMENT

1985 Tuna/Dolphin Observer Data Base Summarized

Biological technicians Randy Rasmussen and Rick Lindsay completed editing data which had been collected in 1985 by NMFS technicians (observers) aboard tuna purse seiners in the eastern tropical Pacific Ocean (ETP). Observers are placed aboard tuna vessels by the National Marine Fisheries Service to monitor purse seine operations to ensure that fishermen abide by federal regulations and to collect dolphin specimens and field data. Rasmussen and Lindsay added these data to the tuna/dolphin

data base, which is maintained by the Multispecies Data Management Project. The data base is used for the investigation of the distribution, abundance, mortality and life history of the dolphin populations involved in the tuna purse seine fishery.

Biological technician Al Jackson calculated that 23 observer cruises were conducted in 1985. This is an increase over the 11 cruises fielded in 1984 and provides a sample size of approximately 21% of the fishing trips made by U.S. purse seiners to the ETP during the year.

The 23 observers collectively spent 1,484 days at sea during 1985. The average cruise length was 65 days. While at sea the observers logged 7,147 hours of marine mammal watch effort along transects having a combined length of 86,442 nautical miles.

Marine mammal watch effort

	Total	Cruise Average	Minimum	Maximum
Number of days at sea	1484	65	26	101
Hours spent on effort	7147	311	122	675
Nautical miles of effort	86442	3758	1594	7953

Complete sighting records, including estimates of sizes of dolphin schools and confirmed species identifications, were collected for 18 different species (or stocks of species) of cetaceans. Information for 8 less specific classifications of cetaceans was also collected. The most frequently encountered animal was the offshore spotted dolphin with 1,351 confirmed sightings. (The offshore spotted dolphin is most actively pursued by the ETP purse seine fleet because it is most often associated with tuna.)

Marine mammal sightings and school sizes

Species/stock	Sightings	School size Avg.	Min.	Max.
Offshore spotted dolphin	1351	492	1	6930
Eastern spinner dolphin	591	346	1	4750
Unidentified dolphin	413	234	1	4160
Whitebelly spinner dolphin	209	364	3	3000
Bottlenose dolphin	137	22	1	300
Common dolphin	114	569	3	5500
Unidentified spinner dolphin	77	231	1	1400
Unidentified whale	43	3	1	35
Short-finned pilot whale	41	18	1	100

Striped dolphin	35	154	12	1250
Unidentified small whale	35	7	1	60
Unidentified spotted dolphin	30	372	6	1920
Unidentified large whale	28	4	1	60
Sperm whale	26	6	1	25
Killer whale	15	4	1	17
Risso's dolphin	10	3	1	6
Unidentified beaked whale	9	2	1	5
Coastal spotted dolphin	6	289	5	1031
Rough-toothed dolphin	6	4	3	6
Fraser's dolphin	6	474	12	1200
Blue whale	6	2	1	9
Unidentified rorqual	4	2	1	2
Gray whale	2	1	1	1
False killer whale	1	50	50	50
Unidentified mesoplodon	1	6	6	6
Unidentified cetacean	1	1	1	1

Detection rates of target dolphin stocks, expressed as the number of schools sighted per 1,000 nautical miles of watch effort, ranged from a high of 11.0 schools/1000 miles for offshore spotted dolphin to a low of 0.3 schools/1000 miles for striped dolphin. These figures are for all sea-surface conditions. There is, however, a distinct decrease in the detection rates as the sea-surface condition (as measured by the beaufort wind force scale) deteriorates. The detection rate for all target dolphin stocks for calm sea conditions (beaufort 0 and 1) was 24.3 schools/1000 miles, and the encounter rate during periods of rougher seas (beaufort 4 and 5) was only 12.7 schools/1000 miles. (The amount of watch effort logged during beaufort 0-1 was 17,520 miles, and for beaufort 4-5 was 16,690 miles.)

Sightings per 1,000 nautical miles of observer watch effort

Species/stock	Beaufort number						Total
	0	1	2	3	4	5	
Offshore spotted	14.3	12.8	12.4	10.7	8.2	2.5	11.0
Eastern spinner	9.7	5.3	5.5	4.6	3.7	1.0	4.8
Whitebelly spinner	1.7	2.3	1.9	2.1	1.2	0.0	1.9
Common	4.0	2.7	0.9	0.5	0.6	0.0	1.1
Striped	0.6	0.6	0.5	0.2	0.1	0.5	0.3
Total	30.3	23.7	21.1	18.1	13.9	4.0	19.1

A total of 1,015 purse seine sets was observed in 1985. Of these, 972 were sets made on tuna associated with dolphin schools (dolphin sets), 24 were sets made on free-schooling tuna (school fish sets) and 17 were sets

made on tuna associated with floating debris (log sets). An additional 2 sets were made with no intent to catch fish.

Number of purse seine sets by set type

Set Type	Total	Cruise Average	Cruise Minimum	Cruise Maximum
Dolphin	972	42	18	70
School fish	24	1	0	6
Log	17	1	0	8
Trial	2	0	0	1
Total	1015	44	20	70

A total of 18,646 tons of yellowfin tuna, 285 tons of skipjack tuna and 5 tons of other tuna were loaded aboard the vessels. The average catch from a dolphin set was 18.4 tons, the average from school fish was 30.0 tons, and the average from log sets was 20.6 tons. The overall average set catch was 18.7 tons.

Tuna catch by set type

Set type	Yellowfin	Skipjack	Other	Total	Set avg.	Cruise Min.	Cruise Max.
Dolphin	17867	0	0	17867	18.4	10.3	47.7
School fish	622	97	0	719	30.0	0.0	82.3
Log	157	188	5	350	20.6	0.0	47.5
Total	18646	285	5	18936	18.7	10.3	47.7

The observers counted a total of 4,887 dolphin killed in the vessels' nets. The overall observed dolphin kill per set was 5.03 and kill per ton of tuna loaded was 0.27 animals. Observers examined 982 dolphin specimens in the field, and returned some of the specimens to the laboratory for examination.

Dolphin kill data by species/stock and sex

Species/stock	Number killed			
	Male	Female	?-Sex	Total
Offshore spotted	332	382	2295	3009
Whitebelly spinner	105	117	603	825
Eastern spinner	112	94	454	660
Common	39	43	142	224
Unidentified dolphin	0	0	140	140
Bottlenose	5	3	12	20
Unidentified spinner	0	0	8	8
Rough-toothed	1	0	0	1
Total	594	639	3654	4887

Dolphin kill per set and kill per tuna catch

Species/stock	Sets	Kill	Tons	Kill /set	Kill /ton
Offshore spotted	929	3009	17110	3.24	0.18
Eastern spinner	385	660	7781	1.71	0.08
Whitebelly spinner	161	825	3625	5.12	0.23
Common	19	224	442	11.79	0.51
Striped	1	0	15	0.00	0.00
All dolphin sets	972	4887	17867	5.03	0.27

(A. Jackson, FTS 893-6362)

PACIFIC FISHERIES ENVIRONMENTAL GROUP
Monterey, California

Effect of Climatic Anomalies on Groundfish Habitat Studied

Scientists at the Pacific Fisheries Environmental Group have been using archived data from the U.S. Navy Fleet Numerical Oceanographic Center and other sources to examine the two-dimensional time dependence of El Niño signals as they propagate through environments occupied by various rockfish (Sebastes) species. During El Niño events off California, warming occurs in the upper layers of the California Current. These warmings, which can extend deeper than 250 meters, can be distinguished from other warming events which are forced primarily by atmospheric winds. Atmospheric and oceanic forcing interact in various ways to affect the survival, growth and catchability of rockfish. Since there are over 60 species of rockfish, it would be reasonable to expect them to adapt in different ways to common modes of environmental variability. However, similarities would also be expected, since certain species are frequently found together in the commercial fishery and appear to exploit the environment in similar ways.

Oceanographer Jerry Norton has been studying the physical manifestations of El Niño and its possible impact on larval survival. Norton used three different physical time series. First, he analyzed the atmospheric pressure and wind field over the northeast Pacific Ocean. These elements are extremely important in determining the predominant processes of the California Current. From December through March a well-developed Aleutian Low is correlated with downwelling, and as a result the nearshore mixed layer deepens and the northerly flow is facilitated. This is the period of peak larval rockfish production. Strong winds introduce turbulence in the ocean's surface layers, dispersing food and perhaps disrupting feeding and destroying larvae.

Second, Norton gained an overall perspective of climatic and interannual oceanic changes through analysis of sea-surface temperatures at shore stations for a 68-year period. Since 1929, periods can be identified as cool or warm when compared with the preceding years: 1929-41, warm; 1944-56, cool; 1957-59, warm; 1960-75, cool; and 1976-84, warm. In general, increased equatorward flow occurs during the cool periods and poleward flow is increased during warm periods.

Third, Norton calculated the first difference of the average anomaly to get an idea of El Niño signal variation with depth (Figure 1). Taking first differences emphasizes higher frequency changes, so the magnitude of the local event is emphasized irrespective of climatic context.

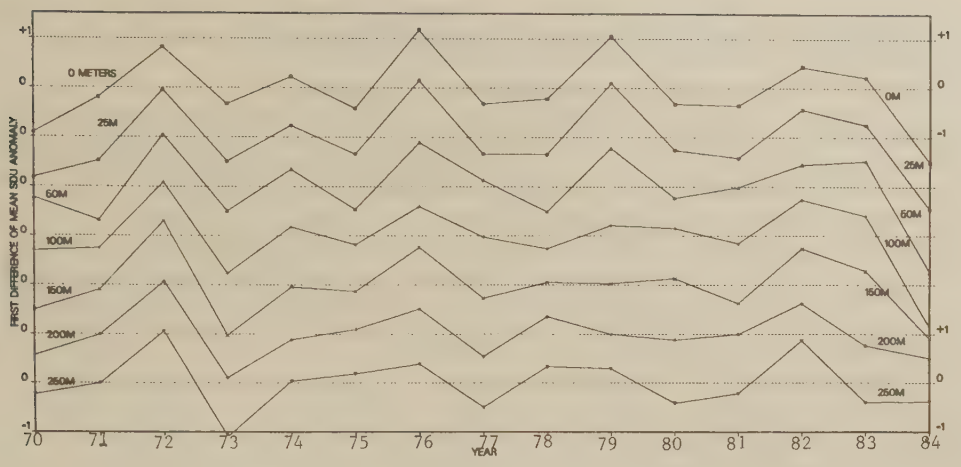

Figure 1. First difference of mean standardized temperature anomaly for the months September through March from 1970 to 1984. The year indicated is the year in which the September through March period begins. Standardized anomalies are in standard deviation units (the anomaly from the overall monthly average divided by the standard deviation of that mean). First difference values have maxima less than 1.5.

Norton suspects that El Niño periods off California, which are accompanied by a deep Aleutian Low and violent winter winds (which occurred in 1956-58 and 1982-1984), are poor for survival of rockfish larvae. However, calm California El Niños may facilitate survival for several species that inhabit the mid and outer continental shelf. Rockfish larvae are produced in winter when northward transport normally is at a maximum. During calm El Niño years, northward transport is enhanced without concomitant increase in turbulent energy transfer from winter storms.

Several commercially important rockfish species inhabit the mid- and outer-continental shelf. These may be the areas which are most affected by current shifts and temperature changes during California El Niños. During anti-El Niño conditions or cool periods, which occurred from 1973 to 1975, flow to the south is enhanced and the tendency for northward flow in the California Current system is reduced. Because of the Coriolis effect, flow to the north is deflected onshore carrying plankton with it. Flow to the south during cool years tends to transport plankton offshore.

Preliminary examination of published age-frequency data suggests that certain rockfish species exploit each of these extremes. Yellowtail (S. flavidus), canary (S. pinniger) and splitnose (S. diploproa) rockfish appear to have good recruitment during calm El Niño years. It is possible that the larva are produced at depth by outer shelf species and as they move toward the surface, they are swept northward and inshore by poleward California Current components. This scenario would place more larvae in the inshore environment where they are known to occur as juveniles. Vigorous, unidirectional swimming would not be necessary in juvenile stages. Larvae swept far to sea, as they are when the

California Current is strong and the temperatures along the coast cool, probably have a decreased chance of survival.

In contrast, anti-El Niño or cool intense California Current years appear to facilitate survival of chilipepper rockfish (S. goodei). It would appear that this species uses a different strategy to enhance the survival probability during early developmental stages. It is known that primary and zooplankton productivity are increased during these years. If the mesoscale variability of the coastal current system could be used to avoid excessive offshore transport of planktonic larvae, greater food sources would be available for early nektonic stages.

One of the several difficulties in this kind of analysis is the lack of information of the three-dimensional distribution of many commercially important rockfish species during various phases of their life cycle. There is considerable three dimensional variability in the California Current. If scientists do not know how immature rockfish orient to this variability, it may be difficult to know in detail how climatic changes affect the various life stages. (J. Norton (408) 646-3311)

TIBURON LABORATORY
Tiburon, California

GROUNDFISH COMMUNITIES INVESTIGATION

Juvenile Rockfishes Resurge in Nearshore and Offshore Areas

The resurgence of many California coastal species both nearshore and offshore following the 1982-1983 El Niño has been documented by the staff of the Groundfish Communities Investigation. Observations and collections taken underwater at representative nearshore stations along approximately 50 km of the northern California coast (Sonoma and Mendocino Counties) have been made by Investigation Leader Dr. Ted Hobson, Fishery Biologist Tony Chess, and Fishery Technician Dan Howard. Working offshore in the Gulf of the Farallones (off San Francisco), Cruise Leader Pete Adams, Fishery Biologist Susan Smith, and Biological Aid Wayne Samiere have taken midwater trawl samples during a cruise aboard the NOAA Ship David Starr Jordan. These two very different methods have produced strikingly similar results.

Young-of-the-year rockfishes (Sebastes spp.), for example, have shown the same patterns of occurrence in both nearshore and offshore samples. These species produce larvae that transform to juveniles during several months in the pelagic zone, and the juveniles of most species then become associated with benthic habitats. The nearshore investigations sampled the juveniles during their first 7 months in the benthic habitats (Tables 1 and 2), whereas the offshore investigations sampled them near the end of their pelagic existence (Table 3).

Table 1. Mean number (standard error in parentheses) of first-year juveniles counted per minute during the same 4-week period each year (early August-early September) in nearshore habitats at Mendocino, 1983-1985.

Species	1983 n=36		1984 n=57		1985 n=50	
S. flavidus	0.000	(0.000)	6.584	(2.287)	115.600	(21.255)
S. mystinus	0.267	(0.091)	1.490	(0.295)	70.560	(15.320)
S. melanops	0.411	(0.143)	0.309	(0.084)	4.340	(1.537)
Total	0.678	(0.189)	8.382	(2.329)	190.500	(29.821)

Table 2. Mean number (standard error in parentheses) of first-year juveniles counted per minute in nearshore habitats during the same periods over 2 years in two different areas.

Species	Mendocino 8/84 n=57		Mendocino 8/85 n=50		Sonoma 8/84 n=37		Sonoma 8/85 n=84	
S. flavidus	6.58	(2.29)	115.60	(21.26)	4.39	(1.48)	135.17	(26.00)
S. mystinus	1.49	(0.30)	70.56	(15.32)	4.89	(1.29)	117.63	(19.50)
S. melanops	0.31	(0.08)	4.34	(1.54)	1.63	(0.52)	4.40	(1.17)
Total	8.38	(2.33)	190.50	(29.76)	10.91	(2.12)	257.20	(35.38)

Table 3. Mean number (standard error in parentheses) of first-year juveniles collected offshore in trawl, June 1983-1985.

Species	1983 n=12		1984 n=6		1985 n=12	
S. entomelas	0	-	0.778	(0.53)	1090.00	(366.62)
S. flavidus*	0	-	3.78	(2.22)	58.0	(25.06)
S. hopkinsi	0	-	0	-	98.7	(68.70)
S. goodei	0	-	0.667	(0.46)	31.2	(11.89)
S. jordani	0	-	1.89	(1.36)	6280.0	(2254.55)
S. melanops*	0	-	0	-	2.87	(1.43)
S. mystinus*	0	-	0.556	(0.54)	174.0	(64.95)
S. paucispinis	0	-	0.111	(0.13)	8.70	(3.84)
S. pinniger	0	-	0.778	(0.44)	3.17	(1.25)
S. saxicola	0	-	0.222	(0.18)	4.01	(2.04)

*Also a major species inshore.

Despite the differences in methods and species, the two investigations documented similar annual variations in abundance--from very low during 1983 (the last year of El Niño) to very high in 1985. For the three species that occurred in significant numbers in both nearshore and offshore samples--S. flavidus, S. mystinus, and S. melanops--the proportions of the three-year totals taken each year were essentially the same in both regions (Table 4). The annual variations differed from species to species, however. For example, while the numbers of S. entomelas (offshore) and S. flavidus (nearshore and offshore) varied greatly, the numbers of S. melanops (nearshore and offshore) did not. (E. Hobson, FTS 556-0565)

Table 4. Number of juveniles taken each year as a proportion of the total number taken during all three years.

	1983	1984	1985
Nearshore			
S. flavidus	0.006	0.037	0.957
S. mystinus	0.003	0.014	0.983
S. melanops	0.080	0.059	0.861
Offshore			
S. flavidus	0.000	0.064	0.987
S. mystinus	0.000	0.003	0.997
S. melanops	0.000	0.000	1.000

Parasites Possibly Inhibit Integration of Filefish into Reef-fish Community

The cysts in the abdominal cavity of the filefish Pervagor spilosoma (noted in the November-December 1985 Report of Activities) have been identified by Dr. Mike Moser (University of California, Santa Cruz) as larvae of the tapeworm order Trypanorhyncha. Although P. spilosoma has been exceptionally numerous in Hawaiian reef habitats during the past year, an assessment of the reef communities at Kona last fall by a team of reef specialists from the Tiburon Laboratory's Groundfish Communities Investigation (Investigation Leader Dr. Ted Hobson, Fishery Biologist Tony Chess, and Fishery Technician Dan Howard) found that most of the filefish had not been integrated into the reef community. Instead of assuming a reef-associated mode following their arrival from a pelagic existence offshore--the normal course in the life history of this species--most filefish remained in the water column above the reef, many of them sluggish and some moribund. After comparing the condition of specimens collected from the water column with the condition of specimens from close to the reef, Hobson found that all of the fish with cysts (and other obvious ailments, including atrophied livers) were among those from the water column. Although the life cycles of trypanorhynchan tapeworms are not well documented, it is known that the original hosts are copepods (thus accounting for infestation of the filefish during its pelagic stage when it is planktivorous), and the hosts of the adults are elasmobranchs. Only the intermediate hosts of the larvae are known to include teleosts.

It is possible that this infestation in some way inhibits the filefish in its changeover from pelagic to reef-associated mode, and thus effectively blocks its integration into the reef community. It is known that many multi-host parasites modify the behavior of intermediate hosts in ways that make that host more vulnerable to predation by the parasite's next host. Certainly a larval tapeworm whose next host is a shark should

benefit from a mechanism that makes its current host sluggish and moribund in the water column above the reef. Staff of the Groundfish Communities Investigation do not have the resources to test this hypothesis, although the research they conduct is concerned with the factors that influence the success of recruitment into fish communities, so they would be very interested in the results of any such test by others. (E. Hobson, FTS 556-0565)

GROUNDFISH ANALYSIS INVESTIGATION

Sampling Plan Developed for the Washington-Oregon-California Sablefish Fishery

Dr. Joseph E. Hightower, Fishery Biologist with the Groundfish Analysis Investigation, reported that a coastwide sampling program for sablefish has been implemented by the states of Washington, Oregon, and California. As part of the sampling program, otoliths will be collected to determine age composition of the catch. The otoliths will be aged at the Northwest and Alaska Fisheries Center in Seattle and the data will be analyzed at the Tiburon Laboratory. Results from the one-year pilot program will be used to develop the 1987 Status of Stocks report and to obtain improved estimates of required sampling effort. These updated estimates, coupled with a year of experience in conducting the program, will determine whether sablefish landings can be sampled routinely in the future.

Two modifications to the plan which was originally proposed were made in order to reduce the workload on port samplers. The first change is that catches will be stratified by the International North Pacific Fisheries Commission (INPFC) by area fished rather than by area landed. Fish caught in a particular INPFC area usually will be landed in several ports, so samplers in adjacent ports will keep in contact to determine when samples from a particular stratum have been collected. The second change is that catches landed in Washington ports will be sampled before they have been unloaded (and sorted into market categories). This eliminates the need to stratify by market category and reduces the number of strata from which samples must be taken. (J. Hightower, FTS 556-0565)

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Statistician Turley Wong and biological aid David Woodbury of the Tiburon Laboratory's Groundfish Analysis Investigation are converting rockfish data collected by the California Department of Fish and Game and the Tiburon Laboratory's cooperative rockfish sampling program to the MS DOS operating system for microcomputers. Data collected between 1983 and 1986 were entered on a CP/M microcomputer system, and data collected between 1977 and 1982 were entered on a main-frame system. The conversions are being made because all users of the data have access to MS DOS systems but not necessarily to the other systems.

Before mid-1985, rockfish landings were only being sampled north of Point Conception. Now rockfish landings are being sampled throughout California and the data from samples collected from southern California are being entered into the data-processing system developed for northern California. In addition, the California Department of Fish and Game is beginning to use the rockfish data-processing system for Dover sole sample data. The Dover sole data will be compiled as part of a coastwide effort to assess the status of Dover sole stocks. (W. Lenarz, FTS 556-0565)

FISHERIES INFORMATION SYSTEMS & ADP

Director, Aids Attend Training Course on CRAY Supercomputer

A one-day course on the Capabilities and Applications of the San Diego Supercomputer Center (SDSC) was attended on January 17 by Director Izadore Barrett, Reuben Lasker and Gary Sakagawa, Division Chiefs at La Jolla and Dorothy Roll, Systems Analyst. The class was sponsored by the University of California, San Diego Extension Service, and held at the Torrey Pines Inn.

Members of the SDSC staff presented an overview of the hardware and software systems of the CRAY X-MP/48 Supercomputer and demonstrated how optimum performance is achieved. This was followed by presentations of how typical scientific and engineering applications are run on supercomputers. The speakers were scientists and engineers from UCSD and the nearby Scripps Clinic. Their topics included applications in structural engineering and biomolecular modeling. At the close of the session, the course participants toured the computer center which is located on the UCSD campus near the main library.

SWFC Staff to Receive Training on Use of the CRAY System

To introduce the staff of the SWFC to the capabilities of the CRAY Supercomputer, training time will be available to individual staff members with the approval of their respective supervisors, according to Dorothy Roll who will be processing requests for use. Each user, authorized for training time, will receive user numbers and password by mail from GA Technology which has overall responsibility for operation and maintenance of the Supercomputer Center. Training for users will be through the on-line HELP on the system.

Any training time used will be charged against the Service Units (SU) allotted to the Southwest Fisheries Center. An SU is equal to the combination of central processor unit used, connect time, input/output resources, and the priority level of execution. As a member of the consortium of the San Diego Supercomputer Center, the SWFC is allocated 50 SUs per calendar quarter, for a total of 200 SUs per year. Under current policy, 50% of the unused units at the end of the quarter is added to the 50 units of the following quarter. Charges for tape mounts and disk storage are not part of the SUs, according to Roll. Each user will be billed for those services by the Remote User Access Center (RUAC).

SWFC Represented at National Data Management Committee Meeting

Supervisory Computer Systems Analyst Dorothy Roll represented the SWFC at a meeting of the National Data Management Committee meeting at the Southeast Fisheries Center in Miami, Florida, February 12 and 13. Chaired by Hoyt Wheeland from the NMFS Office of Data Management and Information Systems in Washington, D.C., the meeting was also attended by Al Jones of the Southeast Fisheries Center, Gene Heyerdahl of the Northeast Fisheries Center, Darrell Tidwell, Northwest and Alaska Fisheries Center, and Fred Brooks and Charles Mesler, contractors on Wheeland's staff.

One of the key agenda items was the report on the progress of the project called "Information Technology 1995 (IT-95)." In December, Wheeland presented the Board of Directors with a report on the concept study for this project. The Board has now given their approval for the National Data Management Committee to proceed with the IT-95 project to establish a nationwide ADP support system.

Following the concept study will be the development of the Requirements Initiative which must be approved by the U.S. Department of Commerce. Charles Mesler has been given a contract to develop the Requirements Statement. Improved communication of information within and among NMFS regions and headquarters in Washington is a recognized need and a telecommunication study will be conducted concurrently with any procurement and implementation of a national computer system. (D. Roll, FTS 893-6250)

ADMINISTRATIVE ACTIVITIES

ADP Management Review Report Completed

The report, A Management Review of Automated Data Processing in the Southwestern U.S., was completed and forwarded to the Deputy Assistant Administrator for Science and Technology, NMFS, on February 21, 1986. This report completes the review of ADP activities in the Southwest Region and the SWFC begun in 1982 under OMB Circular No. A-76 (revised) Performance of Commercial Activities and follows the aborted 1983-1984 Arthur Young & Co. effort.

This report is expected to become part of the NMFS review of ADP activities required by NOAA under the terms of the April 29, 1985 agreement reached between Darrell Tidwell, SEFC, and Jack Coleman of Mr. Winchester's office. (B. Remington, FTS 893-6248)

MISCELLANEOUS

National Research Council-NOAA Research Associateship Program Extended to Honolulu Laboratory of Southwest Fisheries Center

Late in January, Director Barrett was notified by Dr. J. Chester McKee, Director of the NRC-NOAA Associateship and Fellowship programs, that the program will be extended to the Honolulu Laboratory of the Southwest Fisheries Center. This will bring to three the number of Fellows at the Center and will provide one additional research opportunity for Associates to work at the Hawaii location.

The addition of a new Fellow at the Honolulu Laboratory was the result of a review of the credentials of the proposed new Research Advisers and the descriptions of their research programs in Honolulu. According to Dr. Izadore Barrett, Director of the Southwest Fisheries Center, the addition of the new Fellow is a distinct honor for the Honolulu Laboratory as well as for the existing and successful program at the Southwest Fisheries Center which has been in operation for 15 years.

PUBLIC AFFAIRS

La Jolla Laboratory

Dr. Stephen Reilly, Operations Research Analyst in the Oceanic Fisheries Resources Division, presented a lecture on January 10, 1986, at the San Diego Natural History Museum on "The eastern Pacific gray whale population: past, present and future." During his lecture, which was sponsored by the American Cetacean Society, Reilly discussed current interpretations of present abundance, recent trends, population history, and possible future trends in population size.

Tiburon Laboratory

February 4 & 27 - Ed Ueber, at the request of the Southwest Regional Office, arranged and held a course on fish and gear identification for enforcement officers of the California Department of Fish and Game on February 4. Sharon Moreland and David Woodbury held a similar session February 27.

SEMINARS

Honolulu Laboratory

January 20 - Dr. Takafumi Arimoto, Tokyo University of Fisheries, spoke on "Fish capture research in Japan."

La Jolla Laboratory

January 21 - Dr. Yoshiro Watanabe, Tohoku Regional Fisheries Research Laboratory, Division of Fishery Resources, Shiogama, Japan, presented "Why is it difficult to rear marine fish by artificial dry diet: A physiological approach."

23 - Dr. Kenneth Briggs, Institute of Marine Sciences, University of California at Santa Cruz, Santa Cruz, California, gave a seminar on "Scales of aggregation of seabirds in the California Current."

28 - Dr. Randall M. Peterman, Natural Resources Management Program, Simon Fraser University, Vancouver, British Columbia, spoke on "Simulation of west coast English sole: Exploration of alternative hypotheses about early life history processes and the resulting statistical power for estimating population trends."

29 - Ms. Ginny Hostler, Administrative Assistant for Personnel Programs, presented "Southwest Fisheries Center's Affirmative Action: Goals, performance, and current status of SWFC staff and civilian work force."

February 18 - Dr. Jacquie McGlade, Marine Fish Division, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, gave a seminar on "The dynamics of discovery and exploitation in fisheries.

Pacific Fisheries Environmental Group

January 22 - Doris Small, Biological Aide, gave a talk entitled "Fish utilization of a newly created wetlands area in Elkhorn Slough." The research is part of her Master's degree work at Moss Landing Marine Laboratories.

February 14 - Oceanographer Russell Brainard presented a seminar entitled "Fisheries aspects of seamounts and Taylor Columns."

Tiburon Laboratory

January 22 - Dr. Michael Moser, Long Marine Laboratory, University of California, Santa Cruz, spoke on "Parasites as biological

tags in fishes and Sarcotaces (copepoda) in Sebastes spp. (rockfishes)." The Tiburon Seminar Series is a cooperative effort of the Paul F. Romberg Tiburon Center for Environmental Studies (San Francisco State University) and the Tiburon Laboratory.

February 19 - Dr. Michael Josselyn, Director of the Tiburon Center for Environmental Sciences, spoke on "Seagrass ecology from a habitat window." The Tiburon Seminar Series is a cooperative effort of the Paul F. Romberg Tiburon Center for Environmental Studies (San Francisco State University) and the Tiburon Laboratory.

HONORS AND AWARDS

Honolulu Laboratory

January 23 - Director Barrett presented a 10-year service pin to Gary L. Kamer, Statistician, at a general staff meeting.

La Jolla Laboratory

A biographical profile of Center Director Dr. Izadore Barrett has been included in the latest edition of Who's Who in Frontiers of Science and Technology.

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Fishery biologist Dr. Alec MacCall of the Coastal Fisheries Resources Division has accepted an invitation to present a series of lectures at the University of Washington in November 1986. These lectures, which are sponsored by Washington Sea Grant, will be published in book form. MacCall will lecture on the role of density-dependent habitat selection in fish stock-recruitment relationships. Applications include geographically optimal harvesting strategies and a general framework for habitat evaluation.

Tiburon Laboratory

February 21 - Ed Ueber and the Tiburon Laboratory received the Coordinator and the Community Lifesaver Awards, respectively, from the Irwin Memorial Blood Bank. This is the fifth year in a row these awards--the highest attainable--have been received.

VISITORS

Honolulu Laboratory

January 6- 8 - Drs. Dayton L. Alverson and Al Pruter, Natural Resources Consultants (NRC), Seattle, Washington, visited R. Shomura, William G. Gilmartin, and John R. Henderson for information on marine debris. The NRC has a contract with NMFS to develop and implement an educational program, and a program to reduce marine debris and minimize its impact on the ocean's living resources.

9 - Dr. Anthony J. Calio, Richard B. Roe, B. Kent Barton, and Doris Kohler, Office of the Administrator,NOAA, visited the Honolulu Laboratory and met with R. Shomura and senior staff members.

21 - Dr. Roger Seapy, California State University at Fullerton, met with Dr. Boehlert and Bruce C. Mundy, Fishery Biologist, concerning atlantid heteropods in the plankton samples. Seapy worked for nearly 2 weeks removing specimens from the samples.

22 - Dr. Takashi Kubota, Tokai University, Orido, Shimizu, Japan, met with Dr. Boehlert, B. Mundy, research assistant Michael P. Seki, and others to dicuss research programs.

23 - Dr. Takafumi Arimoto, Tokyo University of Fisheries, Tokyo, Japan, visited R. Shomura, Dr. Boehlert, Paul M. Shiota, Dr. Somerton, M. Seki, and others to discuss fishing gear and assessment research.

29 - Dr. Ralph W. Schreiber, Curator of Ornithology, Natural History Museum, Los Angeles County, met with R. Shomura.

February 4 - Dr. Tom Clarke, Department of Oceanography, UH, visited Dr. Boehlert to discuss research conducted at the Honolulu Laboratory on nehu and larval fish distribution.

10 - Jim Hannan, Sippican Corporation, visited Dr. Boehlert to discuss needs and uses of expendable bathythermographs and CTDs.

19 - Gerald R. Anderson, Advisor, Private Enterprise Development, USAID, American Embassy, Suva, Fiji, visited R. Shomura to discuss the Pacific Islands Association Chambers of Commerce export promotion seminar in May 1986.

La Jolla Laboratory

January 16-17 - Norm Abramson, Director of the Tiburon Laboratory, Murray Hayes, Northwest Fisheries Center, Harvey Hutchings,

Northwest Region, and Rod McInnis, Southwest Region, attended the West Coast Groundfish Task Team Meeting.

21 - Ron Lynn hosted a group of Oceanography students from Grand Canyon College, Arizona.

February 4 - Dr. Chengkui Tseng, Director of the Institute of Oceanology, and Dr. Fanghy You, Oceanographer from the Shandong Provincial Association for Science and Technology, China, met with staff members to discuss technology transfer and exchange ideas and information.

Dr. Tseng (second from left) meets with (from right) Center Director Izadore Barrett, Reuben Lasker, Larry Eber, and Nancy Lo.

Pacific Fisheries Environmental Group

January 9 - Jim Lake from the office of the Assistant Secretary of Commerce for Administration visited with Andy Bakun and received a briefing on PFEG activities.

Tiburon Laboratory

January 6 - Dorothy Lowman, of the Pacific Fisheries Management Council, Portland, Oregon, visited the Laboratory to discuss groundfish management with Ed Ueber.

7 - Rex McCardell, an engineer from Mill Valley, California, met with Bill Leet to discuss the design of a hydraulic clam dredge.

- John Palmer, Anderson Marine, Sausalito, California, met with Ed Ueber about wind-generated fishing vessels.

9 - Dr. Izadore Barrett visited the Tiburon Laboratory and addressed a general staff meeting.

17 - Frank Henry, Becky Ota, and John Geibel, California Department of Fish and Game, Menlo Park, California, met with Joe Hightower for preliminary work on a computer program to summarize Dover sole data.

- K. Takayama, Wescon International, San Bruno, California, visited Sus Kato to obtain information about availability of U.S. fish products.

23 - Ed Gallagher, a commercial fisherman from Moss Beach, California, met with Sus Kato to discuss alternative fisheries and fishing methods.

February 4 - Sean Burke, Kingston, Jamaica, met with Sus Kato to obtain information on developing fisheries for underutilized species.

19 - Greg Cailliet, Moss Landing Marine Laboratories, Moss Landing, California, and Senjo Uchida, Director of the Okinawa Expo Aquarium, met with Sus Kato; Mr. Uchida was on a tour of U.S. aquarium facilities.

24 - John Everett, Chief of Policy and Planning, and Howard Hochman, Management and Budget Staff, Washington, D.C., visited the Tiburon Laboratory while in the area for a meeting of the Fishery Management Councils.

MEETINGS AND TRAVEL

Honolulu Laboratory

January 3 - Drs. Boehlert, Jeffrey J. Polovina, and Skillman attended the official ceremony commemorating the inaugural Tropical Ocean-Global Atmosphere cruise of the RV Xianyanghong #14 of the People's Republic of China. Speakers at the ceremony included A. Joseph LaCovey, Director of Public Affairs, NOAA; Daniel K. Akaka, Congressman from Hawaii; Cecil L. Heftel, Senator from Hawaii; Dr. Anthony J. Calio, NOAA Administrator; and Yan Hongmo, State Oceanic Administration, People's Republic of China. There was a NOAA luncheon at the Halekulani Hotel following the ceremony.

8-18 - Dr. Boehlert traveled to Gloucester Point, Virginia, where he presented a seminar and worked on a coauthored paper at the Virginia Institute of Marine Science. Dr. Boehlert later traveled to New Orleans where he attended the

American Geophysical Union Ocean Sciences Meeting and presented a paper and chaired a session on the effects of seamounts on physical and biological processes.

22 - R. Shomura, Dr. Joseph Angelovic, Deputy Assistant Administrator for Science and Technology, NMFS, and Dr. Izadore Barrett, Southwest Fisheries Center Director, attended a data requirement meeting at the Council office.

22 - Dr. Boehlert attended a meeting with a group interested in the Hawaiian Ocean Center, including representatives from the University of Hawaii (UH), the Waikiki Aquarium, and the architects for the project.

23 - Drs. Barrett and Angelovic spoke at a general staff meeting.

24 - R. Shomura attended a seminar on "Prospects and Perspective Development in the Pacific Islands" at the Hilton Hawaiian Village Hotel. The seminar was held in conjunction with the Peace Corps' 25th anniversary celebration.

28 - R. Shomura and Dr. Boehlert met at the Hawaii State Capitol during separate meetings with Representative Peter K. Apo, Chairman, House Committee on Ocean and Marine Resources, and Representative Ken Kiyabu, Chairman, House Committee on Finance, to discuss the proposed Hawaii Ocean Center.

29 - R. Shomura and Dr. Boehlert attended a joint (Committees on Ocean and Marine Resources, Finance, Economic Development, and Ways and Means) legislative informational briefing given by the Departments of Planning and Economic Development and Accounting and General Services on the Hawaii Ocean Center at the State Capitol auditorium.

30 - R. Shomura attended a breakfast discussion on "Marine Research--A Possible Growth Industry for Hawaii," arranged by UH President Albert J. Simone at College Hill. Discussion leader was Dr. Charles Helsley, Director, Hawaii Institute of Geophysics, UH.

February 4 - Dr. Boehlert attended the meeting of the UH Coordinating Council for Research on Seafloor Processes to plan the Sea Grant submission for the 1987-89 proposals.

5 - R. Shomura and Drs. Boehlert, Polovina, and Stephen Ralston participated in a meeting called by Dr. Jack Davidson, Director, UH Sea Grant College Program, to plan cooperative research in fisheries. This was followed by a meeting on February 11 at which Dr. Polovina presented ideas on a cooperative plan for research on the Penguin Bank area with several UH researchers.

11 - R. Shomura traveled to California to attend meetings at the Southwest Fisheries Center and the Southwest Region.

14 - Samuel G. Pooley, Industry Economist, and Drs. Boehlert and Ralston attended a meeting of the Council bottom fish planning team to discuss the management plan and the possibility of limited entry in the NWHI bottom fish fishery.

20-21 - Dr. Skillman and S. Pooley attended the 36th meeting of the Council's Scientific and Statistical Committee. Dr. Skillman reviewed the draft annual Hawaiian lobster fishery report for 1985 at the meeting.

21 - R. Shomura, Dr. Skillman and S. Pooley met with Dr. Jack Davidson; Kitty Simonds, Council; Frank Goto, United Fishing Agency; John Robey, Tuna Boatowners' Co-op. Inc.; and Alvin Katekaru, State Division of Aquatic Resources, to discuss plans for the skipjack tuna workshop scheduled for April 30-May 1, 1986.

21 - R. Shomura attended the Hawaii Fisheries Coordinating Council meeting at the State Department of Land and Natural Resources board room.

La Jolla Laboratory

January 3- 8 - Ken Bliss traveled to Honolulu, Hawaii, to install and field test a CTD profiler and associated computer equipment on the NOAA Ship Townsend Cromwell.

7 - John Carr attended a Pacific Coast Data Committee meeting in San Francisco.

8-27 - Michael Laurs went to Wellington, New Zealand, to develop plans for a cooperative albacore tagging program in the South Pacific and to familiarize himself with the New Zealand albacore fishery.

9-10 - Director Izadore Barrett traveled to Tiburon, California, to discuss administrative matters with Norman Abramson and then went to Sausalito to attend the Fisheries/Aquaculture Planning Committee meeting.

12-17 - Barbara Engstrand went to New Orleans, Louisiana, for timekeeper training in preparation for a changeover to the USDA payroll system.

18-26 - Norman Bartoo traveled to Madrid, Spain, to complete the Yellowfin Year Program Plan and to approve the plan for the International Commission for Conservation of Atlantic Tunas.

20-22 - Dan Huppert attended the annual meeting of NMFS Economic Steering Committee in Seattle, Washington.

21-23 - Director Izadore Barrett traveled to Honolulu, Hawaii, to discuss data needs of the Western Pacific Council.

January 24 - February 8 - Wayne Perryman went to San Miguel Island to deploy targets and collect ground truth data for photogrammetric study.

January 26 - February 8 - Ken Bliss traveled to Honolulu, Hawaii, to participate in the NOAA Ship Townsend Cromwell cruise to conduct biological and hydrological survey of albacore grounds in southern subtropical convergence waters in the South Pacific.

February 28 - March 4 - Michael Laurs traveled to Honolulu, Hawaii, to join and participate in a cruise to conduct biological and hydrological survey of albacore grounds in southern subtropical convergence waters in the South Pacific.

February 8-18 - Charles Oliver traveled to San Miguel Island to conduct tagging of northern elephant seals and census the entire island.

11-14 - Dorothy Roll traveled to Miami, Florida, to attend the National Data Management Committee Meeting at the Southeast Fisheries Center.

12-13 - Izadore Barrett went to Monterey, California, to discuss administrative and personnel matters with Andrew Bakun at the Pacific Fisheries Environmental Group and to Bodega Bay, California, to meet with University of California officials at Bodega Bay Marine Laboratory.

February 14 - March 5 - Reuben Lasker traveled to Hobart, Tasmania and Wellington, New Zealand, to give keynote address to Australian Marine Sciences Association, to confer with fisheries research scientists in Hobart and Wellington, and to hold a workshop in New Zealand.

19-22 - Izadore Barrett attended an NMFS Research Council meeting in Woods Hole, Massachusetts.

February 22 - May 30 - Nancy Lo traveled to Taipei, Taiwan, to present lectures on statistical applications in fishery research at the Institute of Statistics and School of Fisheries in Taiwan.

24 - Director Izadore Barrett met with Bob Eisenbud on tuna porpoise matters in Washington, D.C.

February 25 - March 1 - Jeanne Wexler, David Holts, and Mark Lowry went to Santa Barbara Island to census and tag elephant seal pups.

28 - Izadore Barrett and Paul Smith traveled to Ensenada, Mexico, to make a presentation on SWFC activities to staff of the Centro de Investigacion Cientifica y Educacion Superior de Ensenada and to attend John Elorduy's Master's thesis defense.

Pacific Fisheries Environmental Group

January 13-17 - Russell Brainard, LTJG NOAA Corps, attended the American Geophysical Union meeting in New Orleans. He gave a presentation called "Aspects of the thermohaline structure over southeast Hancock Seamount" which he co-authored with Paul Wittmann of the Naval Postgraduate School. Their work was done in cooperation with Dr. George Boehlert of the Honolulu Laboratory, SWFC.

Tiburon Laboratory

January 7 - Ed Ueber attended a meeting of the PacFIN Pacific Coast Data Committee in Millbrae, California.

7- 9 - Bill Lenarz attended a meeting of the PFMC Groundfish Management Team in Portland, Oregon. Amendments to the Fishery Management Plan were emphasized at the meeting.

14-15 - Sus Kato travelled to Red Bluff, California, with Jim Bybee and Roger Wolcott of the Southwest Region, to meet with personnel from the California Department of Fish and Game and the U.S. Fish and Wildlife Service to discuss Sacramento squawfish predation on juvenile salmon and possible solutions to the problem.

16-17 - Norman Abramson attended a meeting of the West Coast Groundfish Program Task Team in La Jolla.

22 - Ed Ueber attended a meeting in San Francisco on statistical software for microcomputers.

30 - Sus Kato met in Oakland, California, with members of the Vietnamese Fishermen's Association of America to plan an experimental pair-trawling project.

February 8 - Ed Ueber traveled to Monterey to participate in a meeting on the city's grant application to improve Wharf II, the pier used by the commercial fishing industry.

11-12 - Sus Kato attended Seafare in Los Angeles, and conferred with industry personnel on research on bone-softened fish products. He then traveled to Morro Bay to meet with representatives of the California Department of Fish and Game and Sea Grant to discuss alternatives to gillnetting.

12 - Norman Abramson and Ed Ueber attended the Fisheries Forum, a meeting of the Joint Legislative Committee on Fisheries and Aquaculture, in Sacramento, California.

18-20 - Walburga Giguere and Norma Smith traveled to La Jolla to attend the Timekeeping training.

19 - Ed Ueber met with Karen Worcester, Constance Ryan, and Chris Dewees of Sea Grant to discuss subjects including groundfish imports, gillnetting, and technological innovations.

20 - Mickey Eldridge and Bill Lenarz presented a summary of the Tiburon Laboratory's groundfish research to a meeting of Sea Grant employees and advisors in San Francisco.

27 - Ed Ueber met at Terminal Island with the groundfish Working Group to revise the document on conditions within the groundfish fishery pertaining to access management.

PERSONNEL ACTIONS

Honolulu Laboratory

January 13 - Roy L. Bendell, Biological Aid (Fisheries) - Full-Time Temporary Appointment

- Kevin C. Landgraf, Biological Aid (Fisheries) - Full-Time Temporary Appointment.

17 - Susan T. Tanaka, Data Transcriber - Termination-Transfer.

- Happy A. Williams, Biological Aid (Microbiology) - Conversion to Excepted Appointment.

21 - Christopher D. Wilson, Biological Technician (Wildlife) - Part-Time Temporary Appointment.

25 - Susan L. Austin, Biological Technician (Wildlife) - Extension of Temporary Appointment.

- Julie A. K. Leialoha, Biological Technician (Wildlife) - Extension of Temporary Appointment.

28 - Peter G. Bushnell, Biological Technician (Fisheries) - Extension of Temporary Appointment.

February 1 - Julie A. K. Leialoha, Biological Technician (Wildlife) - Termination.

- Gary D. Stephens, Computer Programmer - Resignation.

3 - Jeffrey H. Hoffman, Data Transcriber - Part-Time Temporary Appointment.

18 - Ronald A. Benco, Computer Clerk - Part-Time Temporary Appointment.

- Suella A. Magallanes, Data Transcriber - Part-Time Temporary Appointment.

19 - Dennis G. Lee, Chemist - Full-Time Permanent Appointment.

20 - John T. Harrison, Fishery Biologist (Research) - Extension of Temporary Appointment.

- Brent M. Miyamoto, Computer Programmer - Extension of Temporary Appointment.

24 - John L. Goolsby, Computer Clerk - Part-Time Temporary Appointment.

La Jolla Laboratory

January 6 - Dennis Gruber, Biological Technician - Entered on Duty.

17 - G. Jay Walker, Computer Programmer - Termination of Appointment.

21 - James Payne, Computer Asistant - Entered on Duty.

31 - Pedro Paloma, Fishery Biologist - Voluntary Retirement.

February 7 - Richard Lindsay, Biological Technician - Resignation.

10 - Lavina Williams, Data Transcriber - Expiration of Appointment.

10 - Richard Tauber, Computer Clerk - Entered on Duty.

Pacific Fisheries Environmental Group

January 6 - Linda Garrett, Biological Aide (Fisheries) - Temporary Appointment.

8 - Doris Small, Biological Aide (Fisheries) - Temporary Appointment.

Tiburon Laboratory

January 13 - John Greeley, Editorial Assistant - Emergency Appointment.

February 7 - John Greeley, Editorial Assistant - Termination.

14 - Elizabeth McGahan - Biological Aid - Resignation.

TRAINING

Tiburon Laboratory

January 6 - Brian Jarvis, Biological Technician - Basic Diving
February 7 Training, NOAA.

13-17 - Daniel Howard, Biological Technician - Sampling Technique Workshop, American Fisheries Society.

February 5- 7 - Pete Benville, Research Chemist - Pre-Retirement Counseling, OPM.

13 - Catherine J.C. Hurst, Administrative Clerk - "Dealing with vendors and suppliers," Performance Seminar Group.

STATUS OF PUBLICATIONS

Published

Boehlert, G. W., D. M. Gadomski, and B. C. Mundy. 1985. Vertical distribution of ichthyoplankton off the Oregon coast in spring and summer months. Fish. Bull., U.S. 83:611-621.

Day and night discrete-depth tows were taken off the Oregon coast in spring and summer months to assess the vertical distribution of ichthyoplankton in nearshore waters. Over 1,000 larvae representing 33 taxa of both coastal and offshore ichthyoplankton assemblages were taken; Psettichthys melanostictus was the most abundant coastal species and Lyopsetta exilis the most abundant offshore species. Larvae were generally most abundant at 10-30 m, near the seasonal thermocline in both day and night collections. Larval abundance in July was much higher than in April-May collections. Limited evidence for diel vertical migration suggests that Psettichthys melanostictus moves to surface waters at night and Gadus macrocephalus moves to deeper water at night. No trends of changes in depth distribution were observed with increasing size.

Genin, A., and G. W. Boehlert. 1985. Dynamics of temperature and chlorophyll structures above a seamount: An ocean experiment. J. Mar. Res. 43:907-924.

Three hydrographic surveys comprised of densely spaced XBT and CTD stations were conducted over Minami-kasuga Seamount, in the northwest Pacific (21°36'N, 143°38'E). A cold dome, similar to a Taylor column, was observed above the seamount top during the first survey. Uplifted isotherms penetrated to the lower euphotic zone and were associated with higher chlorophyll concentrations. Vertical displacement of uplifted isotherms decayed with elevation above the seamount, so that both temperature and chlorophyll anomalies were undetectable at depths less than 80 m. Relatively high chlorophyll concentrations in a layer from 80 m to 100 m depth formed a distinctive deep chlorophyll maximum (DCM) which was less well defined away from the seamount. Calculations based on the observed chlorophyll increase and on estimated phytoplankton growth rate suggested a minimal residence time of the cold dome on the order of several days. Zooplankton densities were also higher over the seamount top, both within and above the cold dome. No cold dome, chlorophyll increase, or high zooplankton biomass were detected above the seamount on the second and third surveys, carried out 2 and 17 days later, respectively. Mixing and deflections of isotherms occurred within a "boundary zone" around the seamount slope during the first and third surveys.

Our observations suggest that seamounts are a source of both biological and physical patchiness in the surrounding ocean as features developed above them are swept away. The importance of the seamount-generated "experiment" is discussed in relation to field studies of the DCM. Specifically, our observations suggest that a sharp chlorophyll maximum

can be formed by enhanced *in situ* growth following a sub-surface upwelling event.

Hobson, Edmund S. 1986. Predation on the Pacific sand lance, *Ammodytes hexapterus* (Pisces: Ammodytidae), during the transition between day and night in southeastern Alaska. Copeia 1986(1):223-226.

The Pacific sand lance, a major prey of many fish species important to the commercial and recreational fisheries, is particularly vulnerable to predators during a changeover between distinctive diurnal and nocturnal modes of behavior. The changeover is part of a diel pattern of movements between a feeding ground, nearby schooling sites, and a refuge in the sand. Predators, including rock sole, starry flounder, whitespotted greenling, and great sculpin, concentrated at the refuge site and attacked sand lance that were shifting from an active mode in the water column to a resting mode in the sand. Intensified predation continued for a time that more than doubled the reported duration of intense crepuscular predation on fishes in tropical seas. This was expected because twilight is approximately twice as long at that latitude as in the tropics.

Hohn, Aleta A. and P.S. Hammond. 1985. Early postnatal growth of the spotted dolphin, *Stenella attenuata*, in the offshore eastern tropical Pacific. Fish. Bull., U.S. 83(4): 553-566.

Estimates of length at birth and early postnatal growth are made for the northern and southern populations of the offshore spotted dolphin in the offshore eastern tropical Pacific. Length at birth is estimated to be 85.4 cm for the northern population and 83.2 cm for the southern population. Analyses of series of monthly distributions of length revealed two cohorts born each year in the northern population, at least in the northern inshore part of its geographic range, but only one cohort born each year in the southern population. Growth curves fitted to the means of the monthly distributions of length gave estimates of length at 1 year of 126.2 and 132.6 cm and length at 2 years of 154.3 and 154.9 cm for the two cohorts in the northern population, and length at 1 year of 127.9 cm for the southern population. A growth curve fitted to lengths and ages (in dental growth layer groups) from the northern population gave estimates of lengths at 1 and 2 years of 123.0 and 143.0 cm, respectively.

MacCall, Alec D. 1986. Review of the biological rationale for identifying subpopulations in fisheries, pp. 9-13. *In*: D. Hedgecock (ed.), Identifying fish subpopulations. Calif. Sea Grant College Prog., Univ. Calif. A-032, La Jolla, CA 92093.

Stock definition depends on what we know about a species and how we want to utilize the species. The latter "operational" consideration is often pre-emptive, so that the stock is simply that entity which we are trying to manage. Stock assessment by production models and cohort analysis proceeds directly from this principle. In cases where more information is available, we may be able to identify natural subdivisions of the resource on the basis of morphometric, meristic or electrophoretic patterns. However, this information tends to be translated operationally into rigid geographic terms, despite indications that

actual geographic stock structure is often fuzzy or clinal, and may change over time or with changes in abundance.

Parrish, R. H., D. L. Mallicoate and K. F. Mais. 1985. Regional variations in the growth and age composition of northern anchovy, Engraulis mordax. Fish. Bull., U.S. 84(4):483-496.

Data from the Sea Survey Program conducted by the California Department of Fish and Game were analyzed to describe regional variations in growth and age composition of northern anchovy, Engraulis mordax. Juvenile growth appeared to be greater at higher latitudes and in the offshore portion of the Southern California Bight. Adult growth was less variable; however, there were statistically significant differences between regions. In addition, the growth rate for the southern stock was markedly lower than that of the central stock. This difference in growth rates was used to characterize the area of overlap between the two stocks. Age composition varied with depth of water and geographical location within the Southern California Bight and with latitude. Young-of-the-year and yearling fish were found in larger proportions in shallow water and in the southern and inshore areas of the Southern California Bight. Age compositions of northern anchovies sampled in the California and Mexican purse seine fisheries were compared with those of the Sea Survey Program. This comparison suggests that the present California area restrictions, which exclude the fishery from the nearshore area, greatly reduces the number of young fish in the catch.

Skillman, R. A. 1986. Identifying characteristics of Hawaii's lobster. Hawaii Fish. News 11(2):19.

Wahlen, Bruce E. and Tim D. Smith. 1985. Observer effect on incidental dolphin mortality in the eastern tropical Pacific tuna fishery. Fish. Bull., U.S. 83(4):521-530.

Scientific observers placed aboard a sample of purse seine vessels collect data that are used to estimate the total number of dolphins killed incidentally in the eastern tropical Pacific tuna fishery. If the presence of these observers, who are not crew members, affects incidental kill levels, then the kill estimates will be biased. To test for the existence of such an observer effect, we compared dolphin kill data that had been recorded by observers who differed in levels of obtrusiveness according to their purposes for data collection. Some observers were placed on board primarily to collect data for estimating the total number of dolphins killed annually. Other observers collected data both for that purpose and for monitoring compliance with dolphin-release regulations. Our results confirm that the presence of an observer does affect dolphin kill. The primary effect is an increase in the proportion of sets with no dolphins killed, and a decrease in the proportion of sets with one to nine dolphins killed. While the magnitude of the effect of observers cannot be estimated from our data, estimates of total dolphin mortality based on data collected by the scientific observers are biased downward.

Administrative Reports

Wilson, M. T., and P. L. Jokiel. 1986. Ciguatera at Midway: An assessment using the Hokama "stick test" for ciguatoxin. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Admin. Rep. H-86-1, 23 p.

Harada, T., R. S. Shomura, T. K. Kazama, O. Murata, and S. Miyashita. 1986. The transport of eggs and larvae of skipjack tuna from Hawaii to Japan. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Admin. Rep. H-86-2, 3 p.

Lamadrid-Rose, Y., and G. W. Boehlert. 1986. Effects of cold shock on larval and juvenile tropical fishes: Potential impacts of ocean thermal energy conversion. Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Admin. Rep. H-86-3, 39 p.

Translation

Sasaki, T. 1985. A seamount survey by the U.S. research vessel Townsend Cromwell. [In Jpn.] Enyo (Far Seas) Fish. Res. Lab. (Shimizu) No. 58, p. 3-6. (Engl. transl. by W. G. Van Campen, 1986, 5 p., Transl. No. 102; available Southwest Fish. Cent. Honolulu Lab., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812.)

Approved by Center Director

Balazs, G. H. Lepidochelys olivacea First record of nesting in Hawaii. For consideration for publication in Herpetological Review.

Bindman, Andrew G. The 1985 spawning biomass of the northern anchovy. For consideration for publication in CalCOFI Reports.

Eldridge, Maxwell B., Lee W. Miller, and Holly L. Hulse. Otolith development and confirmation of daily increment formation in larval striped bass (Morone saxatilis). For consideration for publication in Fishery Bulletin, U.S.

Fiedler, Paul C. Entrainment of anchovy eggs and larvae by a displaced offshore eddy. For consideration for publication in CalCOFI Reports.

Holt, Rennie S. Estimates of abundance of dolphin stocks taken incidentally in the eastern tropical Pacific yellowfin tuna fishery. For consideration for publication in Marine Mammal Science.

Holt, Rennie S. Estimating density of dolphin schools in the eastern tropical Pacific Ocean by line transect methods. For consideration for publication in Fishery Bulletin, U.S.

Holt, Rennie S. and John B. Cologne. Factors affecting observer performance during research vessel sighting surveys of dolphin abundance. For consideration for publication in Fishery Bulletin, U.S.

Hunter, J. Roe, Beverly J. Macewicz, and John R. Sibert. The spawning frequency of skipjack tuna, Katsuwonus pelamis, from the South Pacific. For consideration for publication in Fishery Bulletin, U.S.

Johanos, T. C., and A. K. H. Kam. The Hawaiian monk seal on Lisianski Island: 1983. U.S. Dep. Commer., NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFC.

MacGregor, John S. Relative abundance of four species of Sebastes off California and Baja California. For consideration for publication in CalCOFI Reports.

Methot, Richard. Frame trawl for sampling juvenile fish. For consideration for publication in CalCOFI Reports.

Moon, T. W., R. W. Brill, P. W. Hochachka, and J.-M. Weber. L-(+)-Lactate transport into the red blood cells of skipjack tuna, Katsuwonus pelamis. For consideration for publication in Physiological Zoology.

Pitman, Robert L., Anello Aguayo L., and Jorge Urban R. Observations of an unidentified beaked whale (Mesoplodon sp.) in the eastern tropical Pacific. For consideration for publication in Marine Mammal Science.

Woodbury, David P., and William H. Lenarz. Reduction in age-at-length of young widow rockfish, Sebastes entomelas, off the Oregon coast during and after the 1982-83 El Niño. For consideration for publication in Fishery Bulletin, U.S.

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